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The dis-incentive effects of food aid and agricultural policies on local land allocation in developing countries: The case of Malawi

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Food aid and other agricultural policies can create incentives/disincentives in local agricultural production. This paper provides empirical evidence on the disincentive effects of both food aid and some agricultural policies in Malawi. In contrast to previous studies, this paper analyses the impact of food aid on the proportion of land allocated to cereal crops and the interplay of both food aid and other agricultural policies in creating disincentive effects. Data were analysed using the logit transformation regression. It was found that, in addition to the disincentive effects of food aid, agricultural policies including price controls and sustained reliance on imported cereals were also undermining incentives to sustain local agricultural production. Therefore, both food aid and agricultural price policies need to be aligned to farmers' incentives to optimcally allocate land to food production.

Keywords: proportion of land under cereals; food aid disincentives; agricultural policies; price incentives; Malawi

1. Introduction

Many food aid analysts and policy-makers have been scrutinising the overall performance and effectiveness of several decades of food aid programmes on recipient countries (Awokuse, 2006). However, the results on the disincentive impacts of food aid seem to be mixed. While some analysts (e.g., Lowder, 2004; Mabuza et al., 2009) have found little evidence of the disincentive impacts, others (e.g., Levisohn & McMillan, 2004; Gelan, 2007; Tadesse & Shively, 2009) found that food aid programmes have created disincentives in agricultural production. There is a general consensus that for development assistance to meet its objectives in the long term, it must address rural poverty and food insecurity as countries cannot rely on food aid as a long-term policy strategy.

Many food aid recipient countries have been adopting policies that do not create incentives to agricultural production. In addition to the disincentive effects of food aid, other agricultural policies have also been affecting incentives to invest in agricultural production in sub-Saharan Africa countries (Townsend, 1999). Managing food aid without aligning other agricultural policies will not enhance local agricultural production and productivity. Incentives and disincentives to agricultural production

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can result from policies that affect agricultural input and output markets, trade and exchange rate policies, policies supporting or penalising non-agricultural sectors, public expenditure/budgetary payments on food and agriculture (e.g. direct payments and subsidised public goods and services), inter-sectoral linkages and feedback from changes in incomes and relative prices (MAFAP, 2011).

The main argument of this paper in the development debate, therefore, is that assessing the potential disincentive effects of food aid also requires some attention to the agricultural policies that a country has been adopting over the years. Although food aid has been found to create disincentives to local agricultural production, the main problem facing major recipients of food aid is failing to adopt agricultural policies that can switch the role of food aid from a mainstay of food relief to domestic food economy. Relying on food aid might not be long-lasting (USAID, 2005). This paper analyses the disincentive effects of food aid and agricultural policies in Malawi compiling secondary data from 1975–2007. Unlike previous studies that have explained agricultural production to understand the disincentive effect of food aid, this paper directly explains the land allocation decision itself, which is conceptually better related to incentives/disincentives.

The remaining part of this paper is organised as follows. Section 2 provides an overview of food aid in Malawi. Section 3 discusses the price and agricultural policy factors causing disincentives to agricultural production in Malawi. Section 4 presents the research methodology (conceptual framework and empirical model). The results and related discussions are presented in Section 5. The last section presents the conclusions and recommendations based on the empirical results.

2. Food aid in Malawi

By providing food to the hungry and nutritionally vulnerable groups, food aid in the short run reduces the negative humanitarian impact of emergencies like drought, floods and earthquakes. Food aid can also be used to support development projects that promote economic growth (Isenman & Singer, 1977). Through school and community feeding programmes, it can enhance the effectiveness of other development programmes such as nutrition, education, family planning, child survival, and community development (USAID, 2000). It can also provide financing for specific government development projects, directly, as in food-for-work programmes, or indirectly, as rural public works programmes. Food aid also improves access to food by preventing food price increases (USAID, 2000) and reducing price fluctuation and uncertainties (Isenman & Singer, 1977).

Despite its importance in the event of a disaster, when normal food supply channels are disrupted, food aid has also resulted in undesirable consequences (Mabuza et al., 2009). Food production per capita has been falling while food aid receipts have been rising over the last three decades. Some observers interpret these changes as a sign that food aid flows have caused a decline in African agriculture (Abdulai et al., 2005). Critics of food aid argue that large amounts of food aid raise the aggregate food supply on domestic markets, depress domestic prices, and thereby create a disincentive to produce food locally. Resultant distortions in prices make it unprofitable for traders to move food from surplus to deficit areas, resulting in disincentives to domestic food production (Mukeere & Dradri, 2006).

To address the continued food crisis, global food aid to Malawi has increased. There has also been a growing dependency on food aid in Malawi over the years (Jere, 2007).

Switching the role of food aid from a mainstay of food relief to domestic food economy that provides ample incentive to farmers to increase productivity has been an enormous challenge for the Malawi government (Orr & Mwale, 2001). Food aid in Malawi is used for both relief and development purposes. During lesser disasters, food aid has been linked to existing safety net programmes such as public works or food-for-work (Tripathi, 2004).

Interventions in agricultural markets over the years through the Agricultural Development and Marketing Corporation (ADMARC) distorted prices and other market signals and impeded the development of the market in Malawi (IMF, 2008). The parastatal was given the responsibility of organising food markets and fixing nationwide prices, attempting to resolve the issue of providing stable and attractive prices to producers while procuring cheap food to urban consumers, which also could have affected incentives to agricultural production (MAFAP, 2011). Food aid commodities in Malawi include cereal grains (corn, wheat, rice, sorghum) and non-cereals (Tripathi, 2004). Non-cereal food aid comprises diverse but highly valued products such as processed diary, meat and oil products, peas, beans and lentils (Committee on International Nutrition, 1997). Considering the period 1975–2007 in Malawi, year-to-year variations in food aid flows can be noticed, with high food aid flows in the period 1987–94. Food aid shipments were also very low (below 500 metric tons) from 1975 to 1985 (Figure 1). Cereal production shortfalls over the past decades have been offset predominantly by food aid in addition to government imports. The volume of imports and food aid reached an all-time high in 1992/93 following the 1992 drought. The trend in cereals aid and imports declined between 1994 and 1999. According to the FAO (2003), this could be attributed to increased dependence on cassava and sweet potatoes as alternative sources of food. However, surplus production in the 1999/00 and 2000/01 growing seasons resulting from the free distribution of small quantities of fertiliser and seed to smallholder farmers under

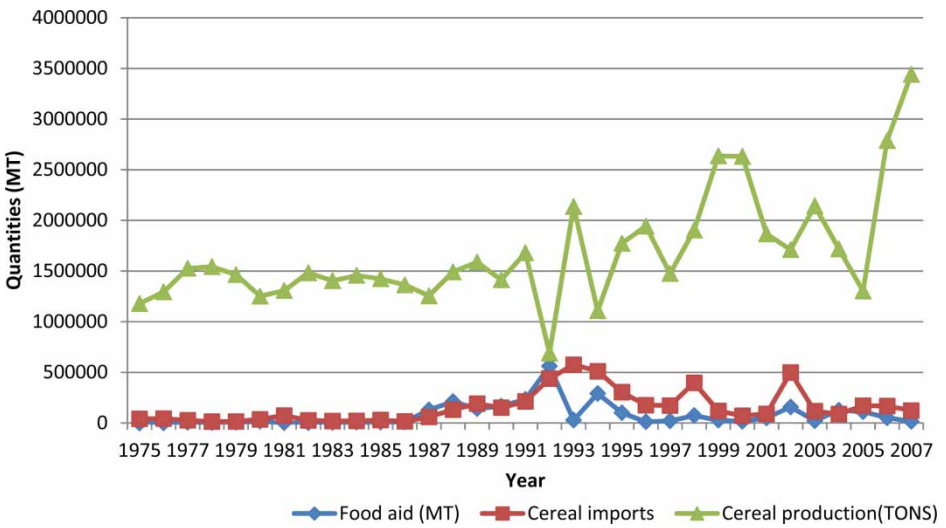

Figure 1: Variations in total quantities of food aid shipments to Malawi (1975–2007)

Note: MT, metric tons.
Source: FAOstats (2010).

the starter pack programme enabled the country to meet its maize requirements as well as to export surplus maize for the first time in more than three decades (FAO, 2003).

3. Agricultural policy factors

Apart from the disincentive effects of food aid, there are other agricultural policy factors that cause disincentives to investment in agricultural production in sub-Saharan Africa countries (Townsend, 1999). These include changes in producer prices, lagged import and export values of cereals, fertiliser subsidies, lack of access to credit, land tenure system, and price supports and controls.

3.1 Land allocation to crop production

About 77% of the total land area of Malawi is under customary tenure. Estate farming occupies about 23% of the cultivated land (FAO, 2007). The main agricultural products grown by smallholder farmers are maize, tobacco, cassava, groundnuts, pulses, sorghum, millet, sweet potato and cotton. Tea, sugar, tobacco and coffee are traditional export products that are largely grown by corporations and large-scale farmers (Chirwa et al., 2006). Maize is the most important food crop, followed by cassava, sweet potato and sorghum (Hazarika & Alwang, 2003). Most households seek to secure sufficient maize as their primary objective. As a result, above 80% of agricultural land is allocated to maize because a reduction in maize production directly impacts household food security (Jere, 2007).

As the population increases, the demand for food continues to go up, due to per-capita increase in food consumption (Southgate, 2009). Contrary to Malthusian predictions, the global population increase has not led to an expansion of farmland and pasture. Instead, agricultural yields have increased due to the green revolution and other technological advances (Southgate, 2009). In Malawi, agricultural land is relatively scarce as there are about 2.3 rural people per hectare of agricultural land, compared with 0.4 people per hectare for all of sub-Saharan Africa (Makombe et al., 2010). Consequently, agricultural expansion is unlikely to happen, particularly in the central and south regions. Moreover, the rate of growth of population in Malawi is as high as 3% or more while the rate of technology adoption is very low (House & Zimalirana, 1992). This puts enormous pressure on the land requirements for food production (ILO, 2010). Since 1975 there has been a steady increase in the proportion of land allocated to production of cereals (as a fraction of arable land) in Malawi (Figure 2), which is unlikely to happen any longer due to land scarcity.

The results of the National Census of Agriculture and Livestock 2006/07 (NACAL, 2007) suggest that lack of capital for investment in agricultural inputs (20%) and reserving land for future use (19%) were the main reasons land was being left uncultivated (Table 1). According to Burrit (2006), the majority of households in Malawi lack access to finance from either formal or informal sources. This is because liberalisation policies, especially the commercialisation of credit, had resulted in high interest rates and made collateral a requirement that made credit less accessible to many smallholder farmers. The results of the National Census of Agriculture and Livestock 2006/07 survey also showed that only 3% of the small-scale agricultural farming households had received credit (Kumwenda & Madola, 2005).

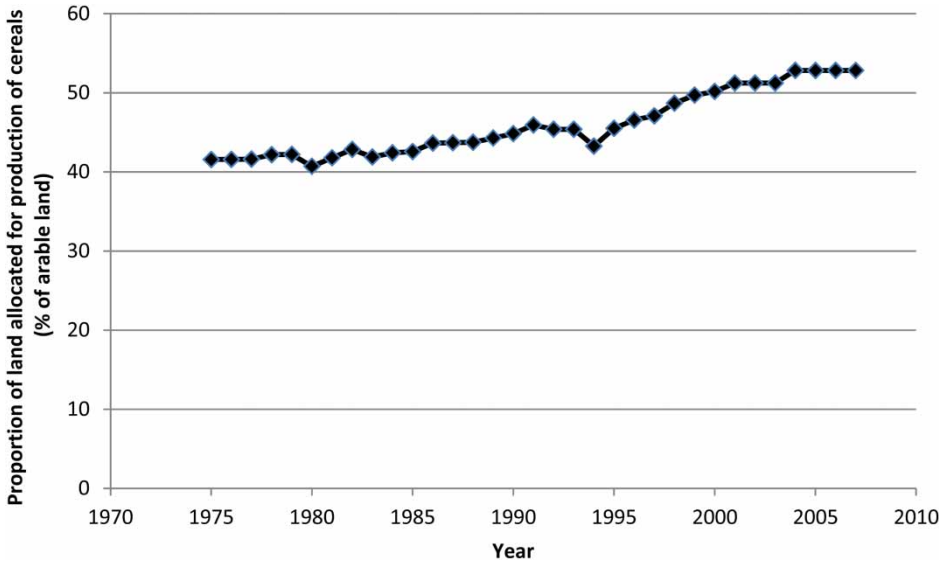

Figure 2: Proportion of land allocated for the production of cereals in Malawi (1975–2007)
Source: FAOstats (2010).

Table 1: Some of the reasons why some land was left uncultivated in Malawi (2006/07 agricultural season)

Reasons why land was left uncultivated	Percentage of respondents (%)
1. Lack of capital	20
2. Land left idle for future use	19
3. Still in the process of opening land	18
4. Insufficient labour	16
5. Other reasons	16
6. Put under fallow	9
7. Woodland preservation	8
8. Land under dispute	3

Note: Percentages do not add up to 100 because some farmers gave multiple reasons.
Source: National Census of Agriculture and Livestock, 2006/07.

3.2 Price incentives

Prices set by the market play a crucial role in regulating the economy (Zitner, 2008). In a neoclassical market economy, prices hold the prospect of profits and give entrepreneurs an incentive to invest, and are thus important indicators for economic players, leading to the most efficient use of scarce resources (Hsieh & Klenow, 2007). Higher food prices can raise farmers' incomes if price movements transmit to local markets and if farmers can respond (Zitner, 2008). Therefore, policies should avoid price distortions as they can discourage necessary investment, divert effort into unproductive activity and encourage inefficient use of resources (Word Bank, 2008). Malawi has a food policy that focuses mainly on maize because of its importance as a staple cereal to rural

livelihoods. Some of the main elements of this policy are interventions in food markets by ADMARC, restrictions on maize trade, and a large fertiliser subsidy programme.

Price control in the form of price ceilings or price floors distort the functioning of agricultural product markets. In Malawi, from the early 1970s up until 2000, all farmers were required to sell their surplus maize produce to ADMARC, which sets a lower buying price and an upper selling price for maize (Jayne et al, 2008). Despite the price controls, maize and other food commodity prices are higher and more volatile than international prices (Minot, 2010). For instance, maize prices in Malawi are generally higher than those in the United States and South Africa. The higher maize prices above the price ceiling are an indication of the existence of a black market for maize, showing that maize prices potentially could have been higher than the ceiling price. Although the price ceiling was abandoned after 2000, the ADMARC has continued to influence maize prices (Minot, 2010). This has been done by paying lower prices to farmers, unfair weighing of maize, late payments and a limited buying schedule that also reduce farmers' incentives, just like the maize price ceiling (Jayne et al., 2008). Thus, although the maize price ceiling was abandoned in 2000, the black market for maize persisted as maize prices continued to be higher than world prices (Minot, 2010).

High input prices will force farmers to cut back on production (Chirwa, 2005). Higher subsidies or lower taxes and tariffs increase the pressure on national budgets and reduce fiscal resources available for much-needed public investment (IFAD, 2008). The fertiliser subsidy in Malawi aims to give farmers an incentive to increase production. The fertiliser sold in the late 1980s and early 1990s was heavily financed by the government and 60 to 70% of the fertiliser was financed by credit that was not repaid (Townsend, 1999). Since the 1970s, Malawi eliminated fertiliser subsidies only in 1985 and then reintroduced them in 1987 (Levy, 2005). In 1995, all subsidies on fertiliser were completely removed when ADMARC's monopoly power over fertiliser distribution was abandoned (Nsuku, 2010). Subsidies were again reintroduced in 1998 in the form of the Starter Pack Input Program. This programme gave all farmers, free of charge, 10 to 15 kg of fertiliser and small quantities of high-yielding seeds (Minot & Benson, 2009). The Starter Pack Input Program was changed in 2005 to the Agricultural Inputs Subsidy Program, a voucher-based national subsidy programme that allows farmers to buy 100 kg of fertiliser at about one-fifth of the market price (Dorward & Chirwa, 2009).

Trade-restricting policies such as export taxes may in the short term benefit domestic consumers. However, such measures will in the long term reduce farmers' incentives to produce, as profit margins will drop (OECD, 2008). The government regularly bans the export of maize when the domestic price is high or when there is some uncertainty regarding the size of the next harvest. As a result, most exports are carried out either by the government as part of government-to-government sales or in the form of informal and illegal cross-border trade (Minot, 2010). Licenses are required to import maize and cassava (Chirwa, 2008).

3.3 Non-price incentives and/or disincentives

Apart from the direct and indirect price incentives, there are non-price factors that affect incentives to invest in agricultural production. These include lack of a land rental market and government interventions that distort local agricultural markets (Thiele, 2002). For efficient land planning and optimum use, it is essential that there be clarity and certainty about title to land (Wadwa, 2002). The majority of the rural population in Malawi is

under the customary form of land tenure. The sale of traditional land rights is restricted by law and this has impaired the transfer of land to the efficient users resulting in low productivity (Nothale, 1986). According to Chirwa (2005), the land tenure system in Malawi's smallholder farmers lacks important characteristics of property rights (enforceability, transferability, universality and exclusiveness) that provide tenure security and facilitate for land to be used by the most productive and efficient farmers.

In 1978, the Malawi government introduced farmer clubs into the smallholder agricultural system. These clubs were intended to be channels through which credit facilities and agricultural advice would be made available to larger number of farmers (Kishindo, 1988). However, liberalisation policies after 1980 have had a negative impact on the performance of smallholder agricultural production. However, apart from the lack of access to credit and the insecure land tenure, disincentives in agricultural production can come as a result of newly emerging income sources (IFAD, 2008).

In general, there are low levels of agricultural mechanisation especially among the smallholder farmers in Malawi (Chirwa, 2005). The three sources of power in Malawi's agricultural sector are: human power, draught animal power and motorised power. Eighty-five per cent of all smallholder farmers exclusively use hand tools for all their agricultural operations, particularly in land preparation. Motorised power is commonly used among the large-estate farmers. For economies of scale and other related reasons, it is uneconomical for small farmers to use motorised power. Draught animal power is used by 13% of the smallholder farmers and very little by large estates (Kumwenda, 2000).

4. Research methodology

4.1 A new approach to explain the disincentive effects of food aid

The proportion of land allocated annually for the production of cereals is used as a proxy to measure the disincentive impact of food aid in Malawi. An incentive is any factor (financial or otherwise) that induces a particular course of action, or counts as a reason for preferring one choice to the alternatives (Campbell, 1995). The paper argues that land allocated for the production of cereals is the decision that better reflects farmers' incentives or disincentives. Previous studies used local agricultural production as a response variable. In this paper, conceptually, land allocation decision (not total cereal production) is considered a better indicator to understand incentive/disincentive effects. This is mainly because production is affected by the amount of land allocated to cereal production and productivity. The productivity of land is a function of technical inputs and nature. Unpredictable natural factors affect the outcome variable, cereal production. Attributing cereal production to disincentive effects of food aid would partly be a wrong attribution to the extent that natural factors are random. Agricultural production is affected by more random natural factors not controlled in the model. This is especially the case for rain-fed smallholder cereal production in developing countries like Malawi.

Over 90% of the cereals in Malawi are produced by smallholder farmers (World Bank, 1995). The 'dependency syndrome' due to food aid is typical among smallholder farmers and hardly affects the large-scale commercial farmers (Isenman & Singer, 1977). In addition, food aid to Malawi is in the form of cereals (mainly maize and wheat). Moreover, maize is the staple food for Malawi, and other cereals such as wheat, sorghum, millet and cassava are close substitutes (Hazarika & Alwang, 2003).

To the authors' knowledge, no previous study has used land allocation to explain disincentive effects of food aid. The proportion of land allocated for production of cereals (mainly grown by smallholder farmers) is used as a proxy to study the disincentive effects of food aid in Malawi. Non-cereals were not considered because they are relatively less important and no data were available. Accounting for the policy and other factors causing disincentive effects on land allocation (Φ_1), the proportion of land allocated to cereal production (P_L) can be expressed as:

$$P_L = f(\Phi_1) \tag{1}$$

The decision and the disincentive variable is land allocation, not total quantity of production. According to this model, the higher (lower) the proportion of land allocated for the production of cereals, the higher the incentive (disincentive) for smallholder farmers in Malawi to invest in cereal production. Thus, if food aid reduces the proportion response variable or if the food aid coefficient is negative and significant, the result would show its disincentive impact on land allocated to cereal production. In most developing countries, food aid interacts with other agricultural policies that result in disincentives in local food production. Thus, the study also aimed at analysing the disincentive impacts (if any) of other agricultural policies (such as input subsidy, price ceiling, and export barriers).

4.2 The empirical model and data description

Ordinary least squares (OLS) regression can be used to estimate the parameters of an equation showing the proportion of land allocated to cereal crops (as a fraction of the total arable land) as a dependent variable. However, for a proportion-dependent variable ranging between zero and one, the classical OLS is inappropriate because the prediction can be beyond the zero–one limits (Papke & Wooldridge, 1993). For this reason, this study adopted a logit transformation procedure that has been used, for example, by Birkhaeuser et al. (1991) and Wale (2010). The model is used to empirically examine the impact of food aid and agricultural policies on smallholder farmers' land allocation decisions.

The dependent variable is the natural log of the transformed proportion variable. The independent variables are described in Table 2, with the expected signs presented based on past literature and theory. Fertiliser subsidies, maize price ceilings and technological advancement were constructed as dummy variables. Secondary data were obtained from FAOstats (2010), UNdata (2010) and ILO (2010).

The proportion of land allocated for the production of cereals in each year (P_L) was transformed as below:

$$\text{Trans}\, P_L = \text{In}\left[\frac{P_L}{1 - P_L}\right] \tag{2}$$

The transformation was followed by the application of OLS to the transformed dependent variable:

$$\text{Trans}\, P_L = \beta_0 + \sum_{i=1}^{m} \Theta 1 i \beta i + \varepsilon_i, \quad i = 1, 2, 3, \ldots m \tag{3}$$

Table 2: Explanatory variables and the expected signs

Variable	Expected sign	Description and reasoning
Trans_P_L	Dependent variable	The transformed proportion (see Equation (2) for the transformation procedure) of land allocated for production of cereals (maize, cassava, rice, wheat, sorghum and millet) as a fraction of total arable land
Explanatory variables		
FOOD_AID	–	The larger the quantity of food aid received in previous year (in tons), the less the proportion of land allocated for production of cereals the current year due to the disincentive effects of food aid through low food prices and dependency syndrome (lagged)
FPI	+	The higher the food price index in the previous year, the higher the proportion of land allocated for production of cereals in the current year (lagged)
IMP_VAL	–	Higher values of food imports (in $1000) are expected to result in a depression of the prices of food commodities and hence creating a disincentive to allocation of land to cereals (lagged)
EXP_VAL	+	Higher values (in $1000) of food exports are expected to increase the local prices of food and hence creating an incentive to allocation of land to cereals (lagged)
POPULATION	+	The higher the population, the larger the land area that need to be allocated for production of cereals
DROUGHT	–	The less the rainfall (in mm), the greater the effect of drought on draught animal power causing a decline in land allocated for cereals
D_1	+	Dummy: one for fertiliser subsidies used in the period 1975–95, and zero otherwise. Fertiliser subsidies (D_1, D_2, D_3 and D_4) are expected to induce farmers to allocate more land to cereals
D_2	+	Dummy: one for fertiliser subsidies used between years 1998 and 2000 (i.e. Starter Pack Input Program), and zero otherwise
D_3	+	Dummy: one for fertiliser subsidies used from 2000 to 2004 (i.e. TIP), and zero otherwise
D_4	+	Dummy: one for fertiliser subsidies used from 2005 to 2007 (i.e. Agricultural Inputs Subsidy Program), and zero otherwise
PRICE_CEIL	+	Price ceiling dummy: one for years with price ceiling, and zero otherwise. The presence of a price ceiling (lagged) means less profitability and hence less land allocated for cereals in the subsequent years

where Trans P_L = Trans_P_L, Φ_{1i} = FOOD_AID, Φ_{2i} = IMP_VAL, Φ_{3i} = EXP_VAL, Φ_{4i} = POPULATION, Φ_{5i} = DROUGHT, Φ_{6i} = D_1, Φ_{7i} = D_2, Φ_{8i} = D_3, Φ_{9i} = D_4, and Φ_{10i} = PRICE_CEIL. An explanation (based on previous literature and theory) of why these variables have been included in the model is provided in Table 2.

5. Results and discussions

5.1 Results of the transformed logit model

Table 3 reports the logit-transformed OLS empirical results. The *F*-statistic was found to be significant at the 5% level of significance with goodness of fit $R^2 = 0.97$. The same model was also estimated including a trend variable to capture variables changing

Table 3: Logit-transformed OLS regression results

Trans_P_L	Coefficient	Standard error	*t*	*P* > *t*
FOOD_AID	-9.45×10^{-8}*	0.00	−1.88	0.07
FPI	−0.00016	0.00	−0.67	0.51
IMP_VAL	-4.90×10^{-7}**	0.00	−1.96	0.06
EXP_VAL	-7.43×10^{-7}	0.00	−0.79	0.44
POPULATION	4.24×10^{-8}**	0.00	5.47	0.00
DROUGHT	-6.08×10^{-6}	0.00	−0.19	0.85
D1	0.01	0.02	0.67	0.51
D2	0.074***	0.02	3.22	0.00
D3	0.103***	0.03	3.26	0.00
D4	0.1**	0.05	2.18	0.04
PRICE_CEIL	−0.015	0.02	−0.99	0.33
Results of the linktest				
_hat	0.804634	0.40661	1.98	0.057
_hatsq	0.107602	0.22358	0.48	0.634
_cons	0.086245	0.18036	0.48	0.636
Breusch–Pagan/Cook–Weisberg test for heteroscedasticity				
χ^2 (1) = 0.59				
Prob > χ^{22} = 0.4441				
Durbin–Watson statistic	(12,33)	1.7		
Breusch–Godfrey LM (Lagrange multiplier) test for autocorrelation				
lags(*p*)	1			
χ^2	0.847			
Prob > χ^2	0.3575			

Note: Dependent variable = Trans P_L. $R^2 = 0.98$, Adjusted $R^2 = 0.97$, Prob > $F = 0.0000$. ***1%, **5% and *10% levels of significance.

Data source: FAOstats (2010), UNdata (2010) and ILO (2010).

over time (such as technology). However, heteroscedasticity and strong multicollinearity (between the population and trend variable) were detected and hence this was not pursued.

The linktest for model specification was used to detect the model's specification error. From Table 3, the test of _hatsq is not significant. Thus, linktest failed to reject the assumption that the model is specified correctly. Therefore, there was no specification error. In addition, the model was tested for multicollinearity, heteroscedasticity and autocorrelation. Multicollinearity was checked by examining variance inflation factors. The degree of multicollinearity among the explanatory variables, given by average variance inflation factors of 7.3 (Table 3), was less than the critical value of 10 (Gujarati & Porter, 2009). There was no heteroscedasticity since the calculated χ^2 value (0.59) was smaller than the tabulated χ^2 value (3.381) at the 5% significance level and one degree of freedom (Table 3). Autocorrelation was tested using the Durbin–Watson test. The Durbin–Watson value of 1.7 indicated that there was no autocorrelation. A further test of autocorrelation using a more powerful test, the Breusch–Godfrey test (lag length = 1 lag), also confirmed that there was no autocorrelation (Table 3).

5.2 Food aid disincentive impacts

Quantities of food aid in previous years had significant negative effect on the proportion of land allocated for the production of cereals in the subsequent year (Table 3). Despite previous studies (e.g. Barrett et al., 1999; Tapio-Bistrom, 2001; Lowder, 2004; Mabuza et al., 2009), the results of this study suggest that food aid had significant disincentive effects on land allocated to cereals in Malawi. Although the approach is different, the results are in conformity with other studies including, for example, Mann (1967), Levisohn & McMillan (2004), Tadesse & Shively (2009) and Gelan (2007).

According to Schultz (1960) cited by Gebreselassie (2000), in order for food aid to have negative disincentive effects the food aid commodity has to be identical to the domestically produced food. In Malawi, the main food aid commodities in the period 1975–2007 were staples (maize and wheat) (Tripathi, 2004). Thus, food aid in Malawi could have caused disincentive effects resulting in the disruption of the local markets. This is mainly because food aid has been in the form of maize, a staple crop in Malawi. Food aid also results in disincentive effects if it is not targeted to the most food insecure and poor segment of the population (Schultz, 1960, cited by Gebreselassie, 2000). This is mainly because, if food aid is not targeted, commodities handed out to households are likely to be exchanged in the market (Donovan et al., 2006), creating market price distortions. According to the disincentive argument, large volumes of food aid result in lower food prices that, in turn, create a disincentive to local agricultural production (Schubert, 1981). The major type of food aid in Malawi during the period 1975–2007 was the 'programme food aid' due to the chronic nature of under-production and growing dependence (Tripathi, 2004). This type of food aid was not targeted to specific groups of beneficiaries (Jere, 2007) and this could have caused significant disincentive effects on smallholder farmers' land allocation decisions. Food aid could also have caused disincentive effects because less labour is allocated to the production of cereals. Better income opportunities in off-farm and non-farm sectors could induce farmers to leave agriculture due to increasing opportunity cost of farm labour.

The results reported in Table 3 further suggest that the lagged food price index had no significant effect on the proportion of land allocated for the production of cereals in the current year. The results indicate that farmers in Malawi were less responsive to price incentives. This supports the findings of Chembezi & Womack (1987), who also found that smallholder cotton producers in Malawi were less responsive to price incentives. Smallholder cereal producers in Malawi probably do not respond to market signals possibly due to poor functioning of markets, information problems, high transaction costs, infrastructural and cultural barriers, and land scarcity issues in recent years. Despite the food aid flows over the past 30 years, food prices in Malawi are generally higher than world prices (Minot, 2010). It is thus possible that food aid created disincentive effects not necessarily through depressing the prices of cereals but through creating a dependency syndrome. At the household level, food aid can cause households to reduce their labour supply and discourage household investment in agricultural production (Gebreselassie, 2000). This, according to microeconomic theory, is because transfers increase recipients' welfare and generate income effects that will reduce labour supply as even hard-working people would prefer more leisure to less. However, the distortionary effects of food aid on labour supply appear minimal when food aid is appropriately targeted to intended recipients (Barrett, 2006). If food aid did not depress food prices and non-targeted programme food aid was used

in Malawi, it is possible that the disincentive effects on land allocation were aggravated by distortions in household labour allocation.

5.3 Agricultural policy disincentives

In addition to food aid, the lagged food import value had significant negative effects on the proportion of land allocated for cereals (Table 3). This was expected since the country's dependency on food aid and imported cereals has been growing due to declining production levels (Tripathi, 2004). Continued decline in agricultural productivity would mean that the government had to import food to feed the growing population, which, in turn, would increase the dependency on imported food (World Bank, 2008). Maize imports in Malawi traditionally have been managed by the government through ADMARC. This has led to a situation where everyone expects the government to import in times of shortage (Cromwell & Kyegombe, 2005). An IFPRI policy brief by Makombe et al. (2010) indicates that 80% of Malawi's smallholder farmers are net-buyers of maize. Despite high volumes of cereal imports, the purchase of imported food commodities (especially maize) is hindered by the high import prices due to the country's landlocked geographical position and poor road networks.

On the other hand, the lagged export value had no significant effect on the proportion of land allocated for cereals. This variable was not significant probably due to the export restrictions (meant to protect consumers) and bans that were set by ADMARC (JAICAF, 2008). Thus, there were no incentives to export cereals from Malawi during the period 1975–2007. This was mainly due to export restrictions that inhibited food exports inducing local farmers to limit the land they allocated for the production of cereals (OECD, 2008).

Many development economists and international development agencies point to the high cost and limited effectiveness of fertiliser subsidies in the 1970s and 1980s (Minot & Benson, 2009). Some international donors including IFAD (2008) have argued against input subsidies on the basis of increased pressure on national budgets and fiscal strains. However, proponents of input subsidies believe that fertiliser subsidies can help African agriculture and generate income benefits to the rural poor. Input vouchers have been proposed as a way to make fertiliser subsidies more targeted (Minot & Benson, 2009).

According to the empirical results reported in Table 3, the Starter Pack Input Programme (SPIP) employed from 1999 to 2000, the Targeted Input Programme (TIP) used from 2001 to 2004, and the Agricultural Inputs Subsidy Program (AISP) used from 2005 to 2007 significantly induce farmers to allocate more land for cereal production in Malawi. On the other hand, the universal subsidy programme used in the years from 1975 to 1995 did not significantly influence the proportion of land under cereals. The major difference between the universal subsidy programme and the other three types of input subsidies was that the former was not targeted (Minot & Benson, 2009). Considering Malawi's emerging land pressures, with an average smallholder farm size of less than one hectare, worsened by the ever-declining soil fertility in most farm lands, fertiliser, improved seeds, and better crop management practices would be essential for raising farm productivity in Malawi. Without agricultural inputs (like fertiliser), yields will remain low and farm households will remain food insecure and impoverished (World Bank, 2011). Since fertiliser subsidies are not always

appropriate due to the knock-on effects, it will remain imperative to understand the conditions under which fertiliser subsidies and vouchers make sense (Minot & Benson, 2009). Developing countries like Malawi will find it difficult to sustain non-targeted input subsidy programmes. Population increases have also had a significant positive effect on the proportion of land allocated for cereals. This is in line with the Malthusian predictions and therefore more land would have to be allocated for the production of cereals in response to increasing food demand. Unlike the negative impacts of food aid on land allocated to cereals, Figure 2 shows that the proportion of land allocated to cereal production has been increasing over the period under study. Considering that agricultural productivity is declining in Malawi, while area planted is increasing due to increased population, this means that yields are declining faster. Thus, under these conditions, the rationale for targeted fertiliser subsidies would remain quite strong.

In the presence of a price ceiling, there are no prospects of profits and no incentive for farmers to invest in agricultural production (Hsieh & Klenow, 2007). However, the coefficient for the presence or absence of a maize price ceiling was not statistically significant (Table 3). It might be that the price ceiling has not been enforced and it has led to the emergence of black markets. That is why, despite a maize price ceiling from 1975 to 2000 in Malawi, food prices were generally higher than world prices. As noted by one of the journal reviewers, there is also a chance that effective prices are sometimes below the ceiling price, making the price ceiling policy not binding.

6. Conclusions and recommendations

Malawi faces a challenge in reducing its food sufficiency gap and its dependency on food aid has ever been growing. Most previous studies have used production levels to examine the disincentive impacts of food aid and/or agricultural policies. However, resource allocation decisions, rather than the quantity of production, better capture the disincentives triggered by food aid or other agricultural policies. This paper has examined this relationship using the proportion of land allocated to cereals in Malawi, as a response variable, and considering other agricultural price and trade policies that affect incentives/disincentives. Based on the empirical findings, the paper draws the following conclusions and makes policy recommendations to counter-act the disincentive effects of food aid and align other price policies.

The empirical results have shown that food aid has created disincentives among smallholder farmers in Malawi, without necessarily depressing cereal prices. It could also have created a dependency syndrome by reducing the motivation to self-provision resulting in producers allocating less land to cereals. Food aid could have caused disincentive effects to local agricultural production not only because it was not targeted but also because it was supplied over a long period of time. In addition to food aid, sustained reliance on imported cereals for a long time can create disincentives to allocate land to the production of cereals. In most developing countries, including Malawi, this problem is being aggravated by the ever-dwindling farm size and poor soil fertility. The main food aid commodity (mainly maize) was identical to the domestically produced staple food. To avoid the dependency syndrome and ameliorate the disincentive effects, food aid has to be targeted and supplied for humanitarian purposes only in times of emergency and crisis. Food aid should come in the form of other commodities not identical to the domestically

produced main staple food (maize) to avoid disruption of local maize markets in Malawi. However, the food commodity to be distributed locally must be in line with the tastes and preferences of the local people.

In Malawi, input subsidies (such as fertiliser) have been found to create incentives to allocate land to cereal production. However, the biggest challenge in African countries like Malawi is that input subsidies increase the pressure on fiscal resources and disrupt local fertiliser markets. The Malawian government should continue to use targeted fertiliser subsidies as a way to maintain farmers' incentives, reduce its food sufficiency gap, and reduce the knock-on effects of food aid and other price policies. Efforts should also be directed towards incentivising local cereal production through other improved agricultural inputs such as high-yielding cereal varieties.

Although smallholder farmers are less responsive to market signals, the use of price ceilings is not justified as it leads to the emergence of black markets. Price controls should be avoided as they do not necessarily protect consumers. In the longer term, it shifts back the supply response for food crops. It would, therefore, be beneficial for developing countries like Malawi to gravitate towards a more functioning market where the prices of commodities are determined by forces of demand and supply.

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